

(21) Application No: **0209790.5**

(22) Date of Filing: **30.04.2002**

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(51) INT CL<sup>7</sup>:  
**G11B 27/00**

(52) UK CL (Edition V):  
**G5R RB81**

(56) Documents Cited:  
**WO 1999/038098 A2** **US 6100881 A**  
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**signal processing proceedings, 1997" pages**  
**311-314, Vol 1**

(58) Field of Search:  
**UK CL (Edition T) G4A AUXX, G5R RB81**  
**INT CL<sup>7</sup> G06F 17/30, G11B 27/00**  
**Other**  
**ONLINE:EPODOC,JAPIO,WPI,INSPEC**

(54) Abstract Title: **Authoring of complex DVD-video products**

(57) An authoring method and apparatus are disclosed that create a DVD-video product having complex navigational structure. A first step 101 comprises creating components (201) representing parameterised sections of AV content, and transitions (202) that represent legitimate movements between those components in accordance with playback events (203), such as user commands or timer events. A second step 102 comprises automatically producing a set of AV assets and an expanded datastructure of nodes and links. Finally, in step 103, the expanded datastructure is used to build DVD-video structures with the set of AV assets and related navigation data. As a result, a DVD product having complex navigational structure is authored easily, automatically and reliably.

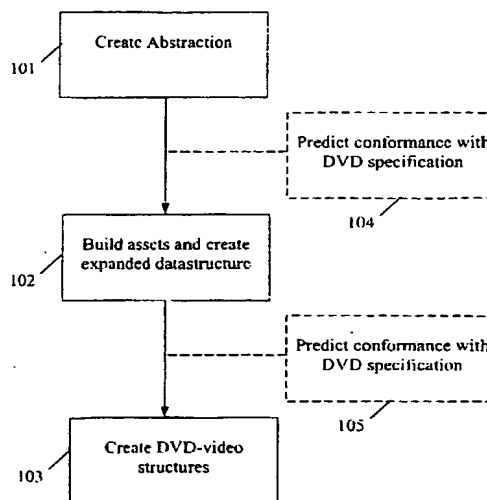
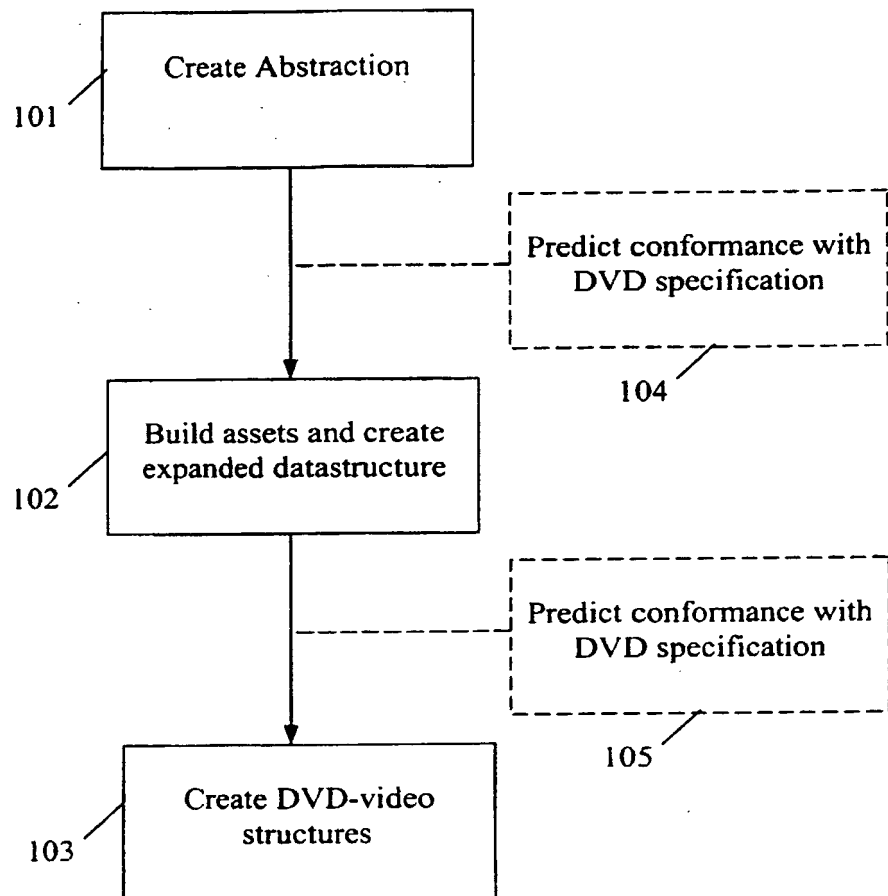
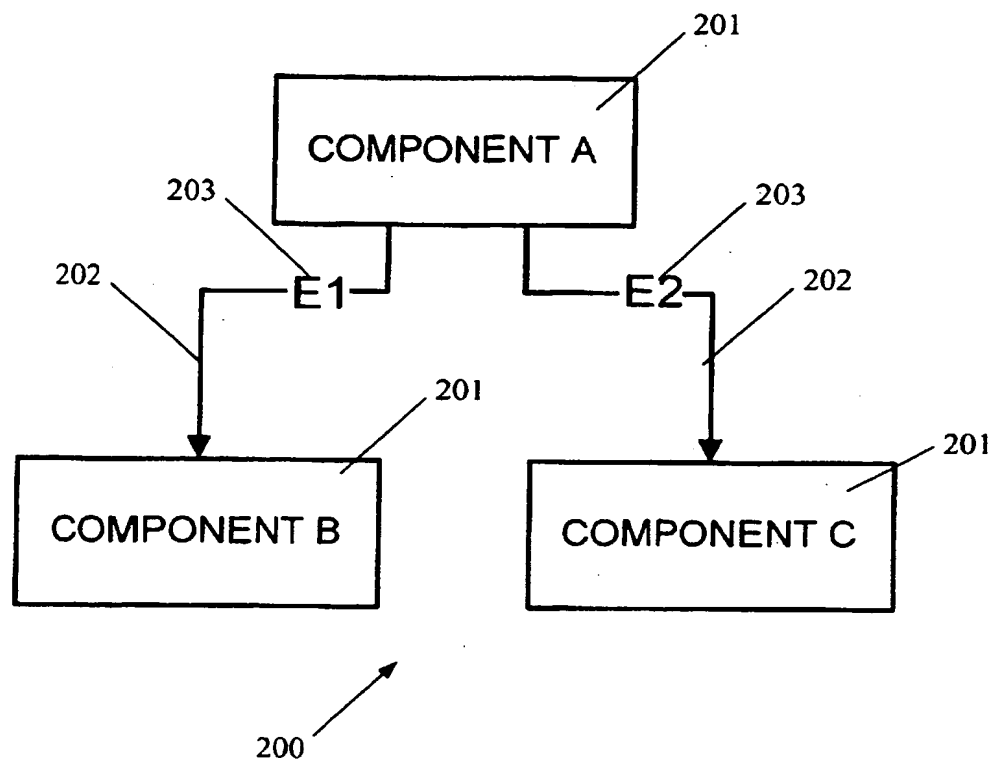
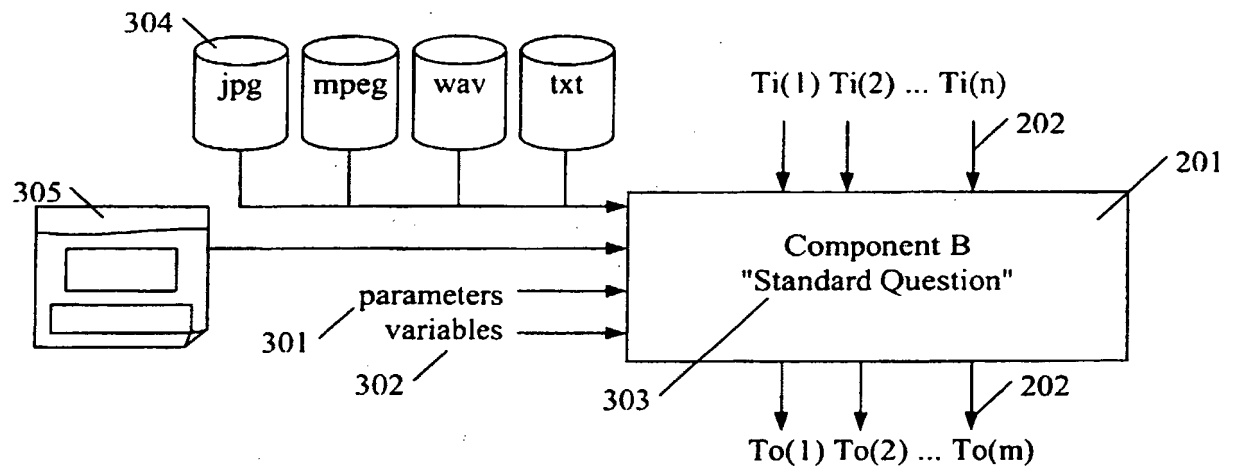


Fig. 1

**Fig. 1****BEST AVAILABLE COPY**

**Fig. 2**

**Fig. 3**

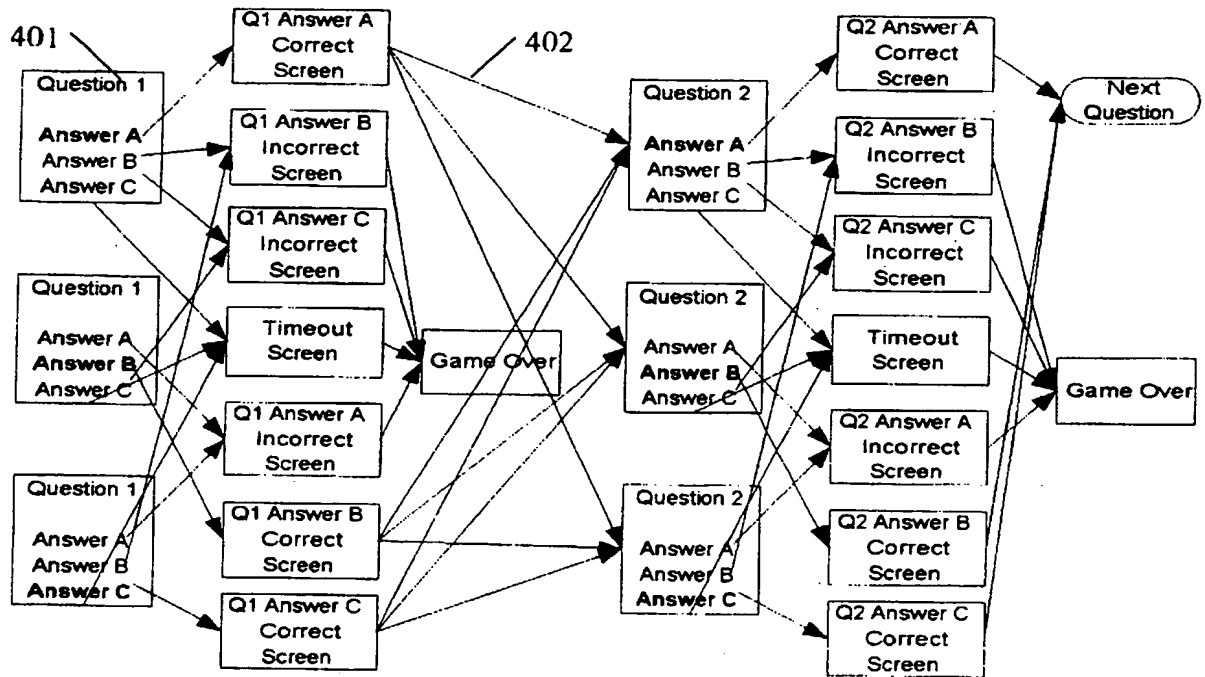


Fig. 4a

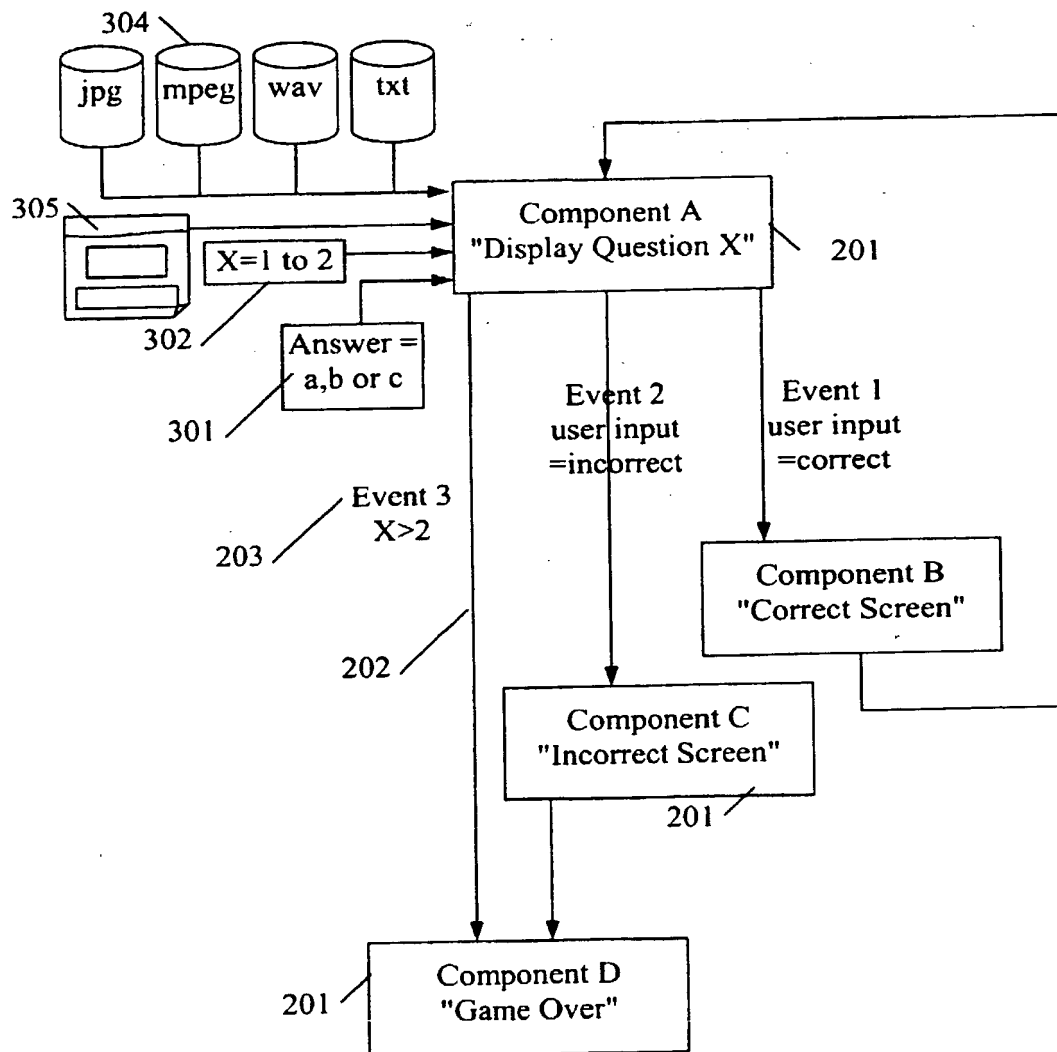
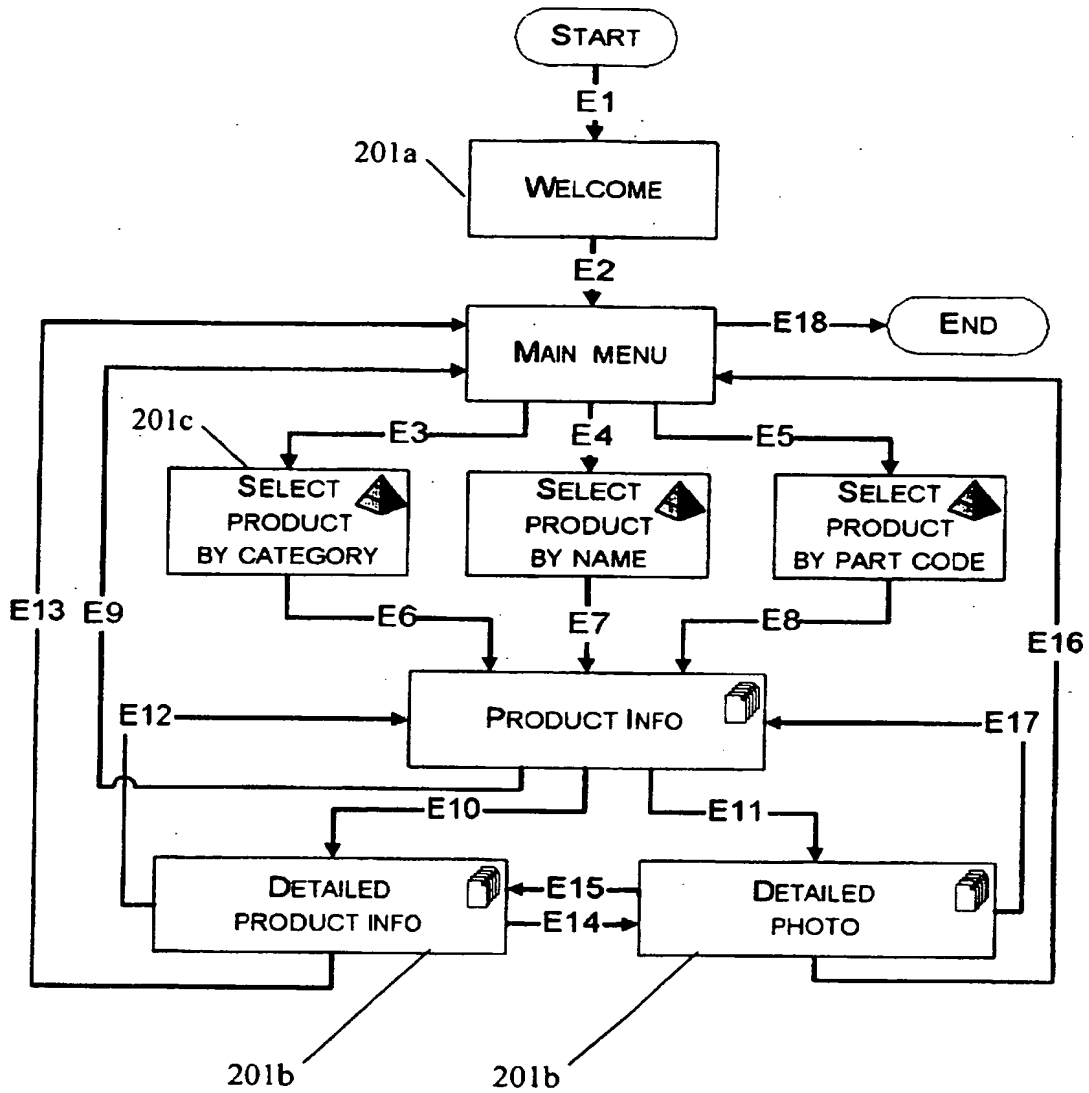


Fig. 4b

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**Fig. 5**

Event	From	To	Conditions	Description
E1	Start	Welcome	Insert DVD	Start
E2	Welcome	Main Menu	Timed event	Display Welcome for 15 seconds
E3	Main Menu	Select Product by Category	Category selected	User chooses a search category
E4	Main Menu	Select Product by Name	Name selected	User chooses a search category
E5	Main Menu	Select Product by Part Code	Part Code selected	User chooses a search category
E6	Select Product by Category	Product Info	Product selected	The user selects a product from a list organised by category
E7	Select Product by Name	Product Info	Product selected	The user selects a product from a list organised by name
E8	Select Product by part code	Product Info	Product selected	The user selects a product from a list organised by part code
E9	Product info	Main Menu	Return to Menu selected	User wants to select a new product or exit
E10	Product Info	Detailed Product Info	Details selected	User wants to see more info
E11	Product Info	Detailed photo	Photo selected	User wants to see big photo
E12	Detailed product info	Product Info	Product info selected	User wants to see summary info
E13	Detailed product info	Main Menu	Return to Menu selected	User wants to select a new product or exit
E14	Detailed product info	Detailed photo	Photo selected	User wants to see big photo
E15	Detailed photo	Detailed product Info	Details selected	User wants to see more info
E16	Detailed Photo	Main Menu	Return to Menu selected	User wants to select a new product or exit
E17	Detailed Photo	Product Info	Product info selected	User wants to see summary info
E18	Main Menu	End	Exit selected	End

Fig. 6



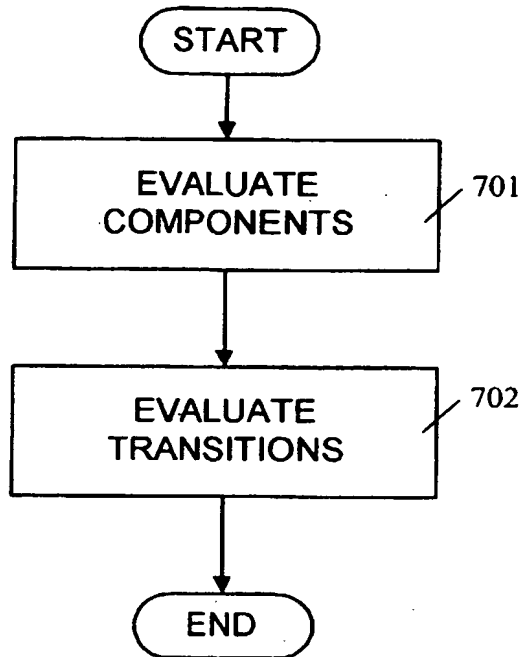


Fig. 7

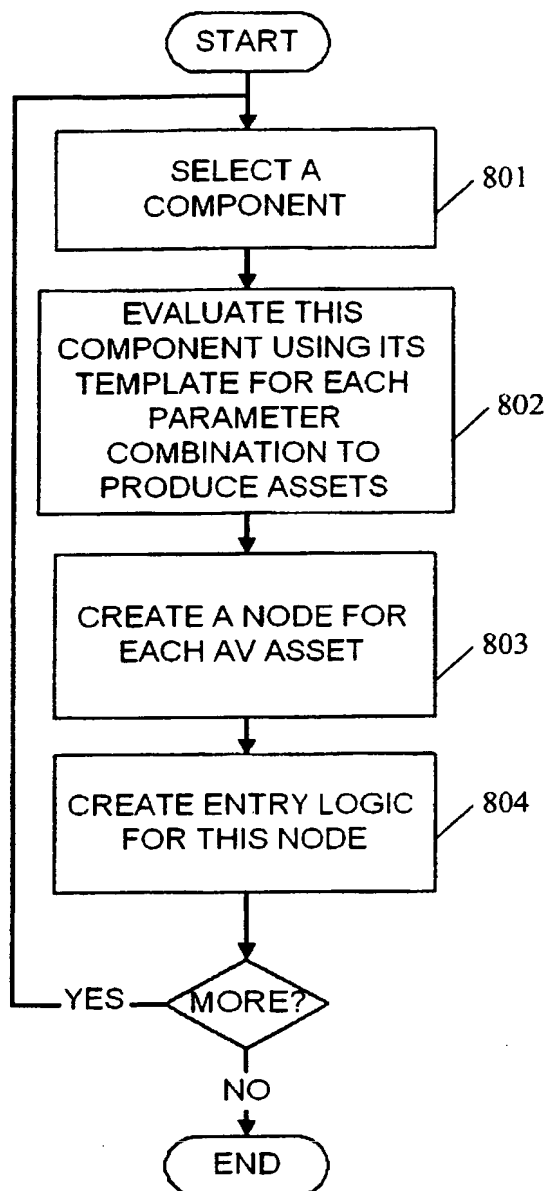
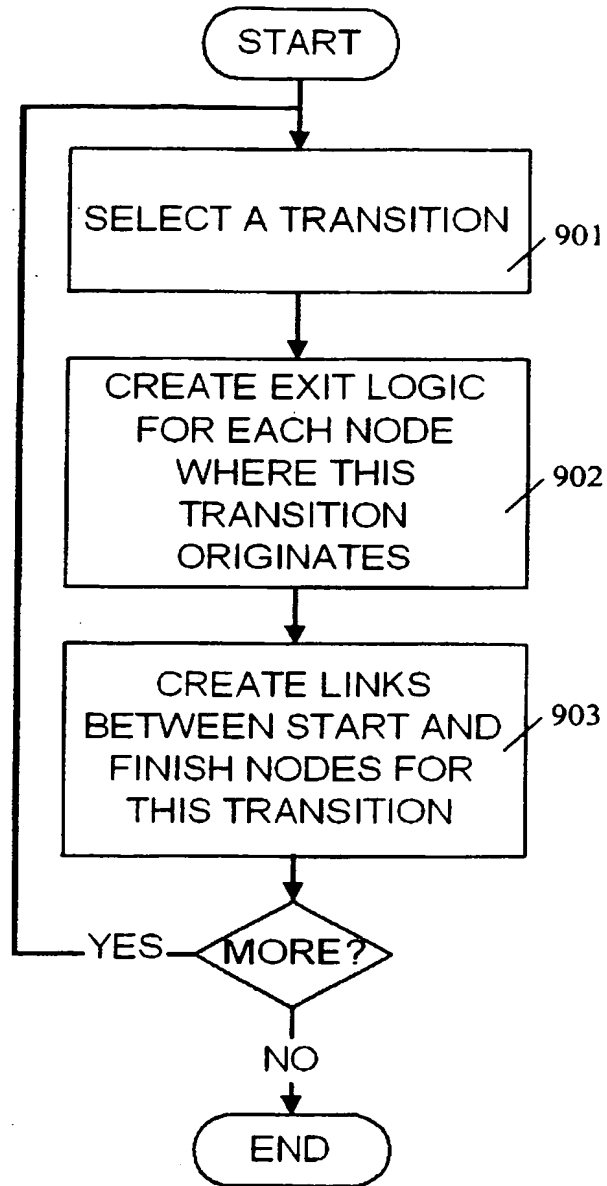


Fig. 8

**Fig. 9**

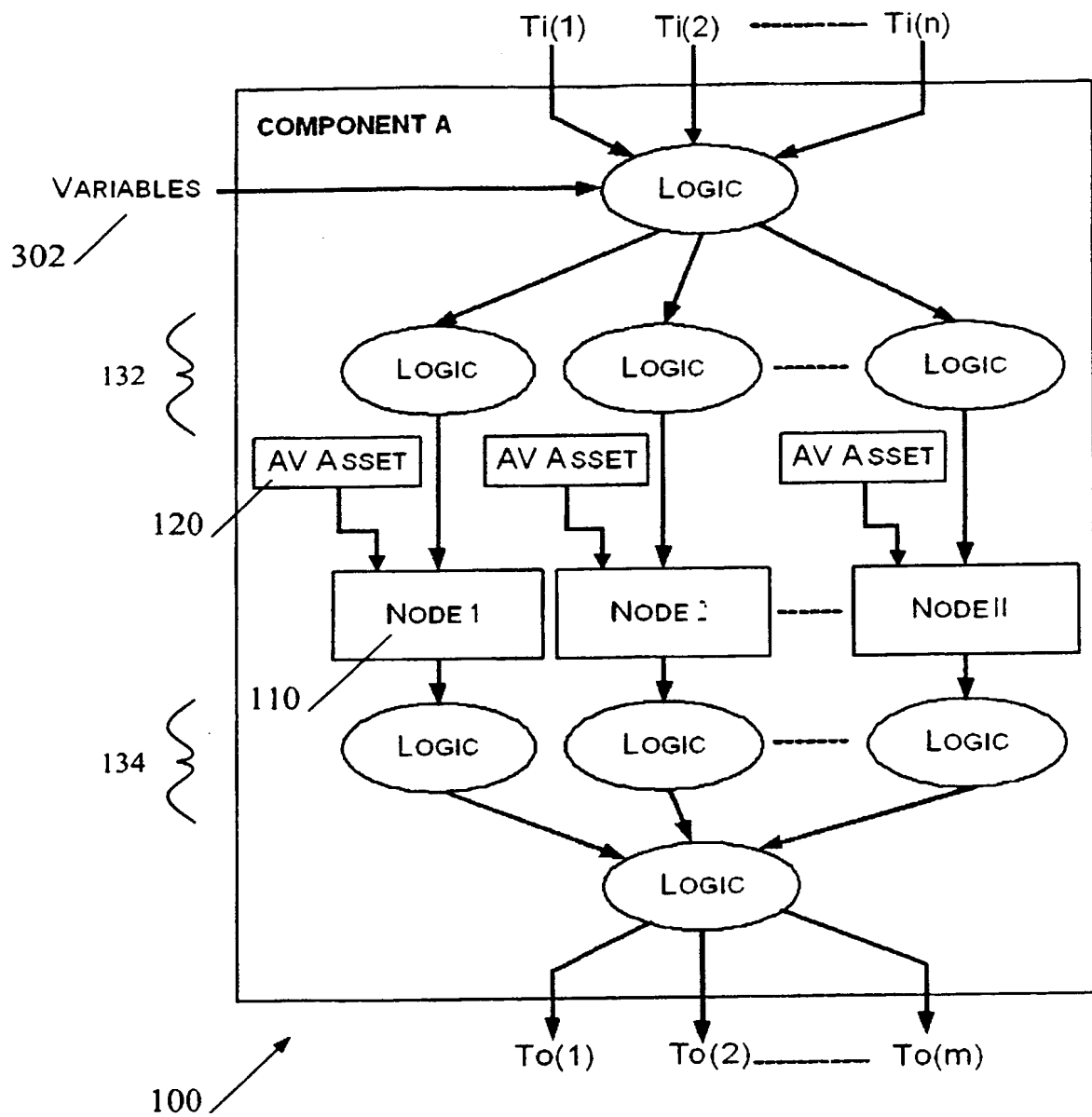


Fig. 10

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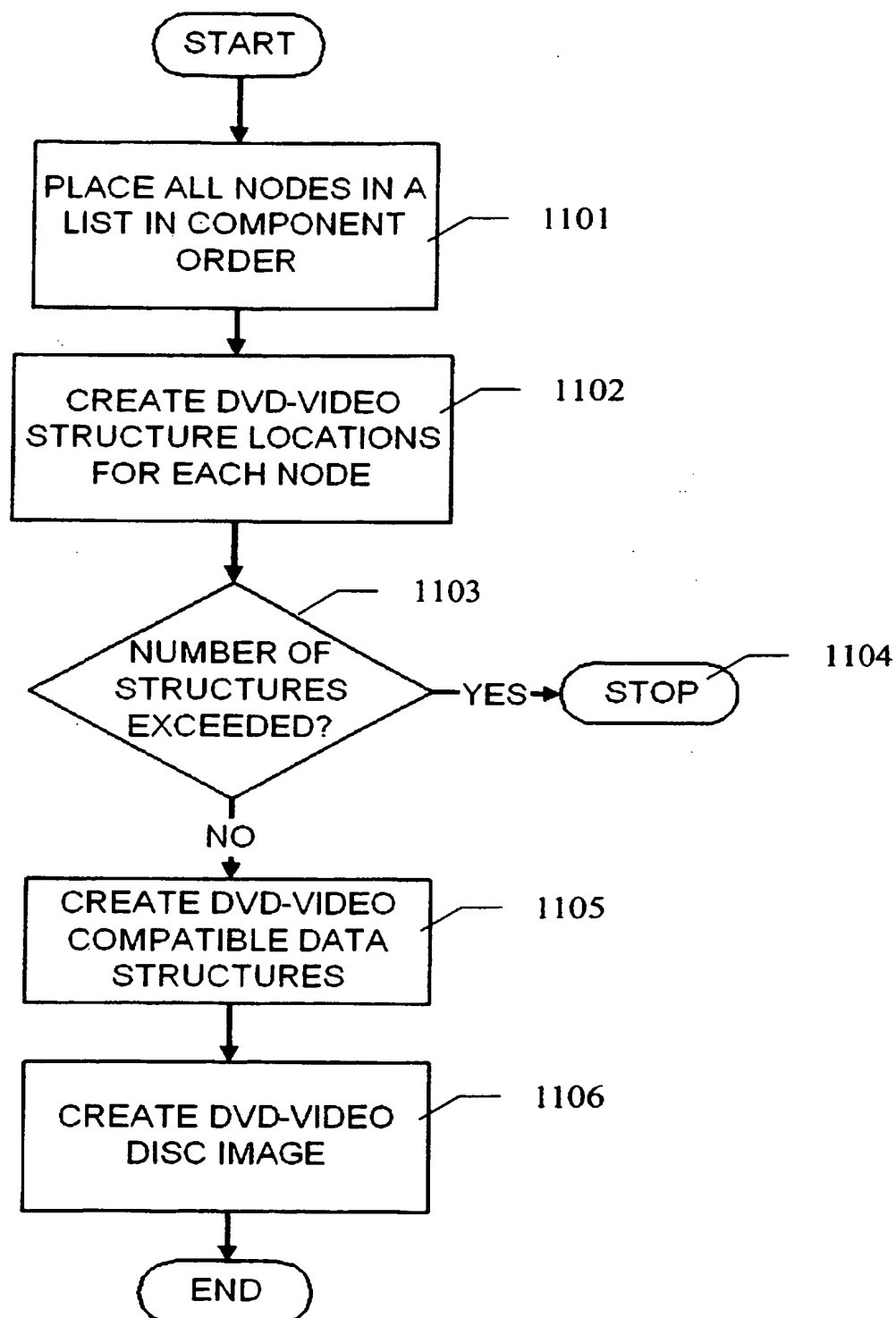


Fig. 11



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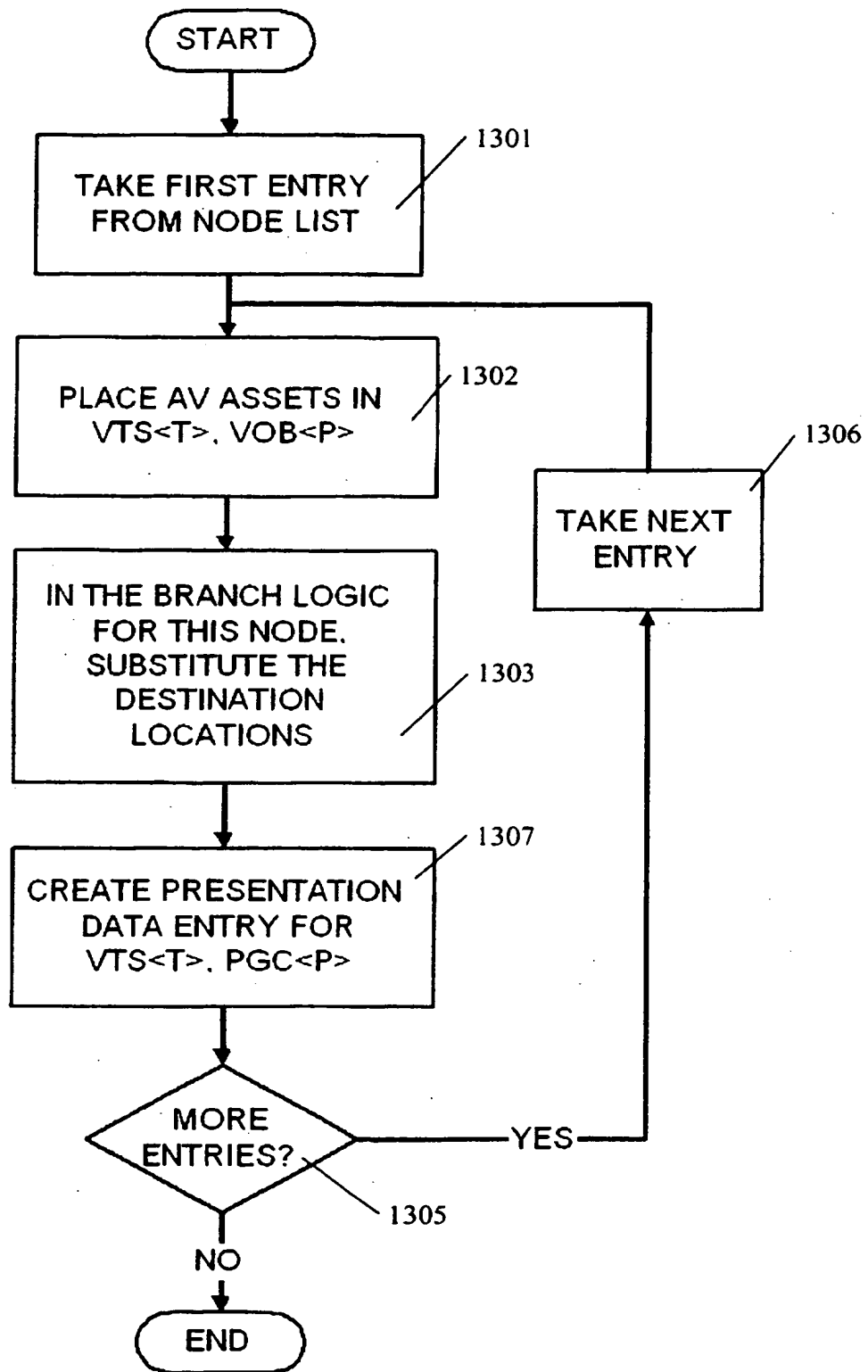


Fig. 13

## Authoring of Complex DVD-Video Products

The present invention relates in general to a method  
5 and apparatus for authoring complex audiovisual content  
into a form compliant with a specification for DVD-video  
and able to be recorded on a DVD-video disc.

An optical disc is a convenient storage media for many  
10 different purposes. A digital versatile disc DVD has been  
developed with a capacity of up to 4.7Gb on a single-sided  
single-layer disc, and up to 17Gb on a double-sided  
double-layer disc. There are several different formats  
for recording data onto a DVD disc, including DVD-video,  
15 DVD-audio, and DVD RAM, amongst others. Of these,  
DVD-video is particularly intended for use with  
pre-recorded video content, such as a motion picture. As  
a result of the large storage capacity and ease of use,  
DVD discs are becoming popular and commercially important.  
20 Conveniently, a DVD-video disc is played using a dedicated  
playback device with relatively simple user controls and  
DVD players for playing DVD-video discs are becoming  
relatively widespread. More detailed background  
information concerning the DVD-video specification is  
25 available from DVD Forum at [www.dvdforum.org](http://www.dvdforum.org).

Although DVD-video discs and DVD-video players are  
becoming popular and widespread, at present only a limited  
range of content has been developed. A problem arises in  
30 that although the DVD specification is very flexible, it  
is also very complex. The process of authoring content  
into a DVD-video compatible format is relatively expensive  
and time consuming. In practice, the flexibility and



functions allowed in the DVD-video specification are compromised by the expensive and time consuming authoring task. Consequently, current DVD-video discs are relatively simple in their navigational complexity. Such simplicity can impede a user's enjoyment of a DVD-video disc, and also inhibits the development of new categories of DVD-video products.

An example DVD authoring tool is disclosed in WO 99/38098 (Spruce Technologies) which provides an interactive graphical authoring interface and data management engine. This known authoring tool requires a relatively knowledgeable and experienced operator and encounters difficulties when attempting to develop a DVD product having a complex navigational structure. In particular, despite providing a graphical user interface, the navigational structure of the desired DVD-video product must be explicitly defined by the author. Hence, creating a DVD-video product with a complex navigational structure is expensive, time-consuming and error-prone.

An aim of the present invention is to provide a method and apparatus for authoring a DVD-video product. A preferred aim is to provide such a method and apparatus able to create a DVD-video product having complex navigational structure. Other preferred aims are to provide an authoring tool which is intuitive and highly flexible to use, and which allows creation of DVD-video products that run efficiently on commonly available DVD-video players.

According to a first aspect of the present invention there is provided an authoring method for use in creating

a DVD product, comprising the steps of: creating a plurality of components representing parameterised sections of audiovisual content, and a plurality of transitions representing movements between components;  
5 expanding the plurality of components and the plurality of transitions to provide a set of audiovisual AV assets and an expanded datastructure of nodes and links, where each node is associated with an AV asset of the set and the links represent movement from one node to another; and  
10 creating a DVD-video format datastructure from the AV assets, using the nodes and links.

Preferably, the method comprises creating at least one information component comprising a reference to an item of  
15 AV content.

Preferably, the method comprises creating at least one choice component comprising a reference to at least one item of AV content, and at least one parameter for  
20 modifying the item of AV content.

Preferably, the choice component comprises a reference to a presentation template and a reference to at least one item of substitutable content to be placed in the template  
25 according to a defining parameter. Suitably, the choice component comprises at least one runtime variable available during playback of a DVD product in a DVD player, and at least one other parameter not available during playback.

30

Preferably, the method comprises creating at least one meta-component representing a set of components and transitions.

Preferably, each transition represents a permissible movement from one component to another component, each transition being associated with a triggering event.  
5 Here, a triggering event includes receiving a user command, or expiry of a timer.

Preferably, the expanding step comprises: creating one or more AV assets from the plurality of components to  
10 provide a set of AV assets; creating the expanded datastructure wherein each node represents one AV asset of the set; and creating a set of links between the nodes.

When at least one choice component has been created,  
15 preferably, the evaluating step comprises evaluating each choice component to create a set of AV assets according to each value of the at least one parameter. Suitably, evaluating each choice component comprises creating entry logic associated with at least one node and/or evaluating  
20 at least one transition to create exit logic associated with at least one node, and providing a link between a pair of nodes according to the entry logic and the exit logic.

25 Preferably, the method comprises the step of checking expected conformance with the DVD format using the created components and transitions.

For a better understanding of the invention, and to  
30 show how embodiments of the same may be carried into effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings in which:

Figure 1 is an overview of a preferred authoring method;

Figure 2 is a schematic diagram showing a simple  
5 abstraction of a desired DVD product;

Figure 3 shows a component in more detail;

Figure 4 shows an example prior art authoring method  
10 compared with an example preferred embodiment of the present authoring method;

Figure 5 shows another example embodiment of the present authoring method using components and transitions;  
15

Figure 6 shows the example of Figure 5 in a tabular format;

Figure 7 is an overview of a method for evaluating  
20 components and transitions;

Figure 8 shows evaluation of components in more detail;

Figure 9 shows evaluation of transitions in more  
25 detail;

Figure 10 shows a portion of an expanded datastructure during evaluation of components and transitions;  
30

Figure 11 is an overview of a preferred method for creating DVD-video structures from an expanded datastructure;

Figure 12 shows a step of creating DVD video structure locations in more detail; and

5        Figure 13 shows a step of creating DVD-video compatible datastructures in more detail.

      An overview of the preferred authoring method is shown in Figure 1. The preferred authoring method is particularly intended for use in the creation of a DVD  
10        optical disc product compliant with a DVD-video specification. The DVD-video specification defines a series of data objects that are arranged in a hierarchical structure, with strict limits on the maximum number of  
15        objects that exist at each level of the hierarchy. Hence, it is desired to create a DVD product which meets these and other limitations of the specification, so that the DVD product will play on commonly available DVD players. However, it is also desired to create the DVD product  
20        having a complex navigational structure, in order to increase a user's enjoyment of the product, and in order to allow the creation of new categories of DVD-video products.

25        As shown in Figure 1, the method comprises three main stages, namely: creating a high-level abstraction representing functional sections of a desired DVD product in step 101, automatically evaluating the high-level abstraction to create a fully expanded intermediate  
30        structure and a set of audio-visual (AV) assets in step 102, and creating an output datastructure compliant with a DVD-video specification using the expanded intermediate structure and AV assets in step 103. The output

datastructure is then recorded on a blank optical disc, to create a DVD-video product.

Conveniently, the DVD authoring method is implemented  
5 as a program, or a suite of programs, running on any  
suitable computing platform, ideally a general purpose  
computing platform such as a personal computer or a  
client-server computing network. Alternatively, the  
method is implemented, wholly or at least in part, by  
10 dedicated hardware.

The method outlined in Figure 1 will now be explained  
in more detail. Firstly, in the step 101, an abstraction  
is created by forming a plurality of components that  
15 implicitly represent sections of AV content of a desired  
DVD-video product, and a set of transitions that represent  
movements between the components during playback.

Figure 2 is a schematic diagram showing a simple  
20 abstraction of a desired DVD product. In the example of  
Figure 2 there are three components 201, linked by two  
transitions 202. The components 201 represent functional  
elements of the desired DVD product, where one or more  
portions of AV content are to be displayed. The  
25 transitions 202 indicate legitimate ways in which the  
product moves from one component to another during  
playback. Here, the transitions are all explicitly  
defined. Each transition 202 is associated with an event  
203, which indicates the circumstances giving rise to that  
30 transition. An event 203 is a triggering action such as  
the receipt of a user command, or the expiry of a timer,  
that influences movement through the sections of AV  
content during playback. Referring to Figure 2, starting

from a particular component A, and given all possible actions, exactly one event 203 will be satisfied, allowing a transition 202 from the current component A to a next component B or C.

5

The preferred embodiment allows for three different types of component. These are an information component, a choice component and a meta-component.

10 An information component represents a single AV asset in the desired DVD-video product. Suitably, an information component simply comprises a reference to an item of audio-visual (AV) content that will be used to create an AV asset in the DVD product. For example, an information  
15 component refers to a welcome sequence that is displayed when the DVD-video product is played in a DVD-video player. The same welcome sequence is to be played each time playback begins. It is desired to display the welcome sequence, and then proceed to the next component. An  
20 information component is used principally to define presentation data in the desired DVD-video product.

A choice component represents a plurality of AV assets in the desired DVD-video product. In the preferred  
25 embodiment, the choice component comprises a reference to at least one item of content, and one or more parameters for modifying the item of AV content. Here, for example, it is desired to present a welcome sequence in one of a plurality of languages, dependent upon a language  
30 parameter. Conveniently, a choice component is used to represent a set of desired AV assets in the eventual DVD product, where a value of one or more parameters is used to distinguish between each member of the set. Hence, a

choice component represents mainly presentation data in a desired DVD-video product, but also represents some navigational structure.

5       A meta-component comprises a procedurally-defined structure representing a set of information components and/or a set of choice components, and associated transitions. Conveniently, a meta-component may itself define subsidiary meta-components. A meta-component is  
10   used principally to define navigational structure in the desired DVD product, by representing other components and transitions.

Figure 3 shows a choice or information component 201  
15   in more detail. The component is reached by following one of a set of incoming transitions 202, labelled  $T_i(1..n)$ , and is left by following one of a set of outgoing transitions  $T_o(1..m)$ .

20       The component 201 is defined with reference to zero or more parameters 301, which are used only during the authoring process. However, the component may also be defined with reference to zero or more runtime variables 302. Each variable 302 records state information that can  
25   be read and modified within the scope of each component, during playback of the DVD product in a standard DVD player. Conveniently, the component 201 is provided with a label 303 for ease of handling during the authoring process.

30

The component 201 contains references to one or more items of content 304. The items of content are raw multi-media objects recorded in a source storage system



such as a file system, database, content management system, or asset management system. An item of content comprises, for example, text files, audio files, image files, or video files, in any suitable raw format. The  
5 reference is a key or index which allows that item of content to be retrieved from the source storage system. The references may be explicit, or may be determined implicitly with reference to values of the parameters 301 and/or variables 302.

10

Conveniently, the component 201 also comprises a reference to a template 305. The template 305 provides, for example, a definition of presentation, layout, and format of a desired section of AV content to be displayed  
15 on screen during playback. A template 305 draws on one or more items of content 304 to populate the template. Typically, one template 305 is provided for each component 201. However, a single template 305 may be shared between plural components 201, or vice versa. A template 305 is  
20 provided in any suitable form, conveniently as an executable program, a plug-in or an active object. A template is conveniently created using a programming language such as C++, Visual Basic, Shockwave or Flash, or by using a script such as HTML or Python, amongst many  
25 others. Hence, it will be appreciated that a template allows a high degree of flexibility in the creation of AV assets for a DVD-video product. Also, templates already created for other products (such as a website) may be reused directly in the creation of a DVD-video product.

30

The parameters 301, runtime variables 302, content items 304 and template 305 together allow one or more AV assets to be produced for use in the desired DVD product.

Advantageously, creating a component 201 in this parameterised form allows a large plurality of AV assets to be represented simply and easily by a single component.

5        To illustrate the power and advantages of creating components 201 and transitions 202 as described above, reference will now be made to Figure 4 which compares a typical prior art method for authoring a DVD product against the preferred embodiment of the present invention.  
10    In this example it is desired to develop a DVD product which allows the user to play a simple quiz game.

      In Figure 4a, each AV asset 401 which it is desired to present in the eventual DVD product must be created in  
15    advance, and navigation between the assets defined using navigation links represented by arrows 402. Here, the game involves answering a first question, and, if correct, then answering a second question. The answer to each question is randomised at runtime using a runtime variable  
20    such that one of answers A, B and C is correct, whilst the other two are incorrect. In this simple example of Figure 4a it can be seen that a large number of assets need to be created, with an even greater number of navigational links. Hence, the process is relatively expensive and  
25    time consuming, and is prone to errors.

      Figure 4b shows an abstraction, using components and transitions as described herein, for an equivalent quiz game. It will be appreciated that the abstraction shown  
30    in Figure 4b remains identical even if the number of questions increases to ten, twenty or even fifty questions, whereas the representation in Figure 4a becomes even more complex as each question is added.

Figure 5 shows another example abstraction using components and transitions. Figure 5 illustrates an example abstraction for a DVD product that will contain a catalogue of goods sold by a retail merchant. A welcome sequence is provided as an information component 201a. Choice components 201b are used to provide a set of similar sections of AV content such as summary pages of product information, or pages of detailed product information including photographs or moving video, for each product in the catalogue. Here, the catalogue contains, for example, of the order of one thousand separate products, each of which will result in a separate AV asset in the desired DVD-video product. Meta-components 201c provide functions such as the selection of products by category, name or by part code. These meta-components are procedurally defined.

Figure 6 shows a tabular representation for the abstraction shown in schematic form in Figure 5.

In use, the authoring method and apparatus suitably presents a convenient user interface for creating components and transitions of the high-level abstraction. Ideally, a graphical user interface is provided allowing the definition of components, transitions and events, similar to the schematic diagram of Figure 5. Most conveniently, the user interface provides for the graphical creation of components such as by drawing boxes and entering details associated with those boxes, and defining transitions by drawing arrows between the boxes and associating events with those arrows. Alternatively, a

tabular textual interface is provided similar to the table of Figure 6.

Referring again to Figure 1, the abstraction created in step 101 is itself a useful output. The created abstraction may be stored for later use, or may be transferred to another party for further work. However, in most cases the authoring method is used to automatically create a DVD-video product, from the abstraction.

Referring to Figure 1, the method optionally includes the step 104 of checking for compliance with a DVD specification. It is desired to predict whether the resulting DVD-video product will conform to a desired DVD-video specification. For example, a DVD specification has strict limits on a maximum number of objects at each level within a hierarchical structure, and limits on the maximum quantity of data that can be stored on a DVD-video disc.

In one embodiment, the step 104 is performed using the created components 201 and transitions 202. As discussed above, the components 201 contain references to items of raw AV content and references to templates, parameters and variables that allow AV assets to be produced. The step 104 comprises predicting a required number of objects at each level of the hierarchical structure, by considering the number of potential AV assets that will be produced given the possible values of each parameter and variable, and provides an indication of whether the limits for the maximum number of objects will be exceeded. Similarly, where a component defines a set of similar AV assets, then it is useful to predict the physical size of those assets, and check that the DVD product is expected to fit within

the available capacity of a DVD disc. Advantageously, the conformance check is performed without a detailed realisation of every AV asset, whilst providing an operator with a reasonably accurate prediction of expected  
5 conformance. If non-conformance is predicted, the operator may then take steps, at this early stage, to remedy the situation. As a result, it is possible to avoid unnecessary time and expense in the preparation of a full DVD product which is non-conformant.

10

As shown in Figure 1, in step 102 the components 201 and transitions 202 of the high level abstraction 200 are evaluated automatically.

15 Figure 7 shows the step 102 of Figure 2 in more detail. The components 201 and transitions 202 may be evaluated in any order, but it is convenient to first evaluate the components, and then to evaluate the transitions. Ideally, any meta-components in the  
20 abstraction are evaluated first. Where a meta-component results in new components and transitions, these are added to the abstraction, until all meta-components have been evaluated, leaving only information components and parameterised choice components.

25

An expanded datastructure is created to represent the abstract components 201 and transitions 202 in the new evaluated form. This expanded datastructure comprises branching logic derived from the events 203 attached to  
30 the transitions 202 (which will eventually become navigation data in the desired DVD product) and nodes associated with AV assets derived from the components 201 (which will eventually become presentation data in the DVD

product). However, it is not intended that the expanded datastructure is yet in a suitable form for creating a DVD video product, since at this stage there is no mapping onto the hierarchical structure specified for a DVD  
5 product.

Figure 8 shows step 701 of Figure 7 in more detail, to explain the preferred method for evaluating components 201. As shown in Figure 8, each information component and  
10 choice component is selected in turn in step 801. Each component 201 is evaluated to provide one or more AV assets in step 802. In an information component, this evaluation comprises creating an AV asset from the referenced item(s) of content 304. In a choice component  
15 this evaluation step suitably comprises evaluating a template 305 and one or more items of content 304 for each value of a parameter 301 and/or a variable 302, to provide a set of AV assets. Suitably, a node in the expanded datastructure is created to represent each AV asset, at  
20 step 803. At step 804, entry logic is created to represent a link to each node such that each AV asset is reached under appropriate runtime conditions.

Figure 9 shows a preferred method for evaluating  
25 transitions in step 702 of Fig.7. Each transition 202 is selected in any suitable order in step 901. In step 902 the conditions of the triggering event 203 associated with a particular transition 202 are used to create exit logic for each node of the expanded datastructure. In step 903  
30 explicit links are provided between the nodes.

Figure 10 is a schematic illustration of a component 201 during evaluation to create a set of nodes 110 each

associated with an AV asset 120, together with entry logic 132 and exit logic 134, defining movement between one node 110 and the next. The entry logic 132 and exit logic 134 reference runtime variables 302 which are available during playback, and the receipt of user commands. Conveniently, the evaluation step consumes each of the authoring parameters 301 associated with the abstract components 201, such that only runtime variables 302, and runtime actions such as timer events and user commands remain.

10

Referring again to Figure 1, a conformance checking step 105 may, additionally or alternatively, be applied following the evaluation step 102. Evaluation of the abstraction in step 102 to produce the expanded datastructure 100 allows a more accurate prediction of expected compliance with a particular DVD specification. In particular, each node of the expanded datastructure represents one AV asset, such that the total number of AV assets and object locations can be accurately predicted, and the set of AV assets has been created, allowing an accurate prediction of the capacity required to hold these assets. Conveniently, information about conformance or non-conformance is fed back to an operator. Changes to the abstract structure of the product can then be made in the abstraction, to improve compliance.

25

Referring to Figure 1, in step 103 the expanded datastructure is used to create specific DVD-video structures according to a desired DVD specification.

30

Figure 11 shows an example method for creation of the DVD video structures. In step 1101, the nodes 110 in the expanded datastructure are placed in a list in order of

the abstract components 201 from which those nodes originated, and in order of the proximity of those components to adjacent components in the abstraction. As a result, jumps between DVD video structure locations during playback are minimised and localised, in order to improve playback speed and cohesion.

Each node is used to create a DVD video structure location at step 1102. Optionally at step 1103 if the number of created DVD video structure locations exceeds the specified limit then creation is stopped at 1104, and an error reported. Assuming the number of structures is within the specified limit then DVD video compatible datastructures are created at step 1105. Finally, a DVD video disc image is created at step 1106. Here, commercially available tools are conveniently used to perform step 1106, and need not be described in detail.

Step 1102 is illustrated in more detail in Figure 12. In this example variable T represents a number of a video title set VTS (ie. from 1-99) whilst variable P represents a program chain PGC (ie. from 1-999) within each video title set. As shown in Figure 12 the nodes 110 of the expanded datastructure 100 are used to define locations in the video title sets and program chains. As the available program chains within each video title set are consumed, then the locations move to the next video title set. Here, many alternate methods are available in order to optimise allocation of physical locations to the nodes of the expanded datastructure.

Step 1105 of Figure 11 is illustrated in more detail in Figure 13. Figure 13 shows a preferred method for



creating DVD-video compatible datastructures by placing the AV assets 120 associated with each node 110 in the structure location assigned for that node, and substituting links between the nodes with explicit references to destination locations. At step 1307 this results in an explicit DVD compatible datastructure which may then be used to create a DVD disc image. Finally, the DVD disc image is used to record a DVD disc as a new DVD product.

10

The DVD authoring method and apparatus described above have a number of advantages. Creating components that represent parameterised sections of audio visual content allow many individual AV assets to be implicitly defined and then automatically created. Repetitive manual tasks are avoided, which were previously time consuming, expensive and error-prone. The authoring method and apparatus significantly enhance the range of features available in existing categories of DVD products such as movie presentations. They also allow new categories of DVD products to be produced. These new categories include both entertainment products such as quiz-based games and puzzle-based games, as well as information products such as catalogues, directories, reference guides, dictionaries and encyclopaedias. In each case, the authoring method and apparatus described herein allow full use of the video and audio capabilities of DVD specifications such as DVD-video. A user may achieve playback using a standard DVD player with ordinary controls such as a remote control device. A DVD-video product having highly complex navigational content is readily created in a manner which is simple, efficient, cost effective and reliable.

30

The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this  
5 specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification (including any accompanying claims, abstract and  
10 drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly  
15 stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.  
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The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any  
25 novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

**Claims**

1. An authoring method for use in creating a DVD product, comprising the steps of:

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creating a plurality of components representing parameterised sections of audiovisual content, and a plurality of transitions representing movements between components;

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expanding the plurality of components and the plurality of transitions to provide a set of audiovisual AV assets and an expanded datastructure of nodes and links, where each node is associated with an AV asset of the set and the links represent movement from one node to another; and

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creating a DVD-video format datastructure from the AV assets, using the nodes and links.

2. The method of claim 1, comprising creating at least one information component comprising a reference to an item of AV content.

25 3. The method of claim 1, comprising creating at least one choice component comprising a reference to at least one item of AV content, and at least one parameter for modifying the item of AV content.

30 4. The method of claim 3, wherein the choice component comprises a reference to a presentation template and a reference to at least one item of substitutable

content to be placed in the template according to a defining parameter.

5        5.        The method of claim 3, wherein the choice component comprises at least one runtime variable available during playback of a DVD product in a DVD player, and at least one other parameter not available during playback.

10       6.       The method of claim 1, comprising creating at least one meta-component representing a set of components and transitions.

15       7.       The method of claim 1, wherein each transition represents a permissible movement from one component to another component, each transition being associated with a triggering event.

20       8.       The method of claim 7, wherein a triggering event includes receiving a user command, or expiry of a timer.

9.       The method of claim 1, wherein the expanding step comprises:

25       creating one or more AV assets from the plurality of components to provide a set of AV assets;

creating the expanded datastructure wherein each node represents one AV asset of the set; and

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creating a set of links between the nodes.

10. The method of claim 3, wherein the evaluating step comprises evaluating each choice component to create a set of AV assets according to each value of the at least one parameter.

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11. The method of claim 10, wherein evaluating each choice component comprises creating entry logic associated with at least one node and/or evaluating at least one transition to create exit logic associated with at least one node, and providing a link between a pair of nodes according to the entry logic and the exit logic.

12. The method of claim 1, comprising the step of checking expected conformance with the DVD format using the created components and transitions.

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**Amendments to the claims have been filed as follows**

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**Claims**

1. An authoring method for use in creating a DVD product, comprising the steps of:

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providing a set of AV assets each comprising a video object, zero or more audio objects and zero or more sub-picture objects, and an expanded datastructure of nodes and links, where each node is associated with one AV asset  
10 of the set and the links represent navigational movement from one node to another; and

creating a DVD-video format datastructure from the set of AV assets, using the nodes and links;

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. the method characterised by the steps of:

creating a plurality of components and a plurality of transitions, where a component implicitly defines a  
20 plurality of AV assets by referring to a presentation template and to items of raw content substitutable in the presentation template, and the plurality of transitions represent navigational movements between components; and

25 expanding the plurality of components and the plurality of transitions to generate the set of AV assets and the expanded datastructure of nodes and links.

2. The method of claim 1, comprising creating at  
30 least one information component comprising a reference to an item of AV content.

3. The method of claim 1, comprising creating at least one choice component comprising a reference to at least one item of AV content, and at least one parameter for modifying the item of AV content.

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4. The method of claim 3, wherein the choice component comprises a reference to a presentation template and a reference to at least one item of substitutable content to be placed in the template according to the at least one parameter.

5. The method of claim 3, wherein the choice component comprises at least one runtime variable available during playback of a DVD product in a DVD player, and at least one authoring parameter not available during playback.

6. The method of claim 1, comprising creating at least one meta-component representing a set of components and transitions.

7. The method of claim 1, wherein each transition represents a permissible movement from one component to another component, each transition being associated with a triggering event.

8. The method of claim 7, wherein a triggering event includes receiving a user command, or expiry of a timer.

9. The method of claim 1, wherein the expanding step comprises:

creating from each one of the plurality of components one or more AV assets to provide the set of AV assets;

creating the expanded datastructure wherein each node  
5 represents one AV asset of the set; and

creating a set of links between the nodes.

10. The method of claim 3, wherein the expanding step  
10 comprises evaluating each choice component to create a plurality of AV assets according to each value of the at least one parameter.

11. The method of claim 10, wherein evaluating each  
15 choice component comprises creating entry logic associated with at least one node and/or evaluating at least one transition to create exit logic associated with at least one node, and providing a link between a pair of nodes according to the entry logic and the exit logic.

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12. The method of claim 1, comprising the step of checking expected conformance with the DVD format using the created components and transitions.

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Application No: GB 0209790.5  
Claims searched: 1-12

Examiner: Robert Price  
Date of search: 31 May 2002

## Patents Act 1977 Amended Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.T): G5R RB81, G4A AUXX

Int CI (Ed.7): G11B 27/00, G06F 17/30

Other: Online: EPODOC, JAPIO, WPI, INSPEC

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	WO 99/38098 A2 (SRUCE)	1-9 & 12
A	US 6100881 A (GIBBONS)	
A	US 5892507 A (MOORBY)	
X	IEEE Transactions on Consumer electronics, Vol 42, No. 3, August 1996, Seong Won Ryu et al, "A hierarchical layered model for DVD authoring system", pages 814-819	1-9 & 12
X	Nasiopoulos et al, "13 th International Conference on Digital Signal Processing Proceedings, 1997" pages 311-314 Vol. 1, "The challenge of DVD authoring"	1-9 & 12

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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